Claims:

1. Switching power supply including a power factor correction circuit comprising:

- a rectifier having a positive and a negative output terminal,

- an inductor having a first and a second terminal, said first terminal being coupled with said positive output terminal,

- a semiconductor switch having a semiconductor body comprising a blocking pn junction, a gate electrode, a source zone of a first conductivity type connected to a first electrode and bordering on a zone forming the blocking pn junction of a second conductivity type complementary to the first conductivity type, and a drain zone of the first conductivity type connected to a second electrode, the side of the zone of the second conductivity type facing the drain zone forming a first surface, and in the region between the first surface and a second surface located between the first surface and the drain zone, areas of the first and second conductivity type nested in one another, wherein the areas of the first and second conductivity type are variably so doped that near the first surface doping atoms in the area of the second conductivity type predominate over those in the area of the first conductivity type, and near the second surface doping atoms in the area of the first conductivity type predominate over those in the area of the second conductivity type, wherein said second electrode is coupled to said second terminal of said inductor and said first electrode is coupled with the negative output terminal of said rectifier,

- a diode having an anode and a cathode, the anode being coupled with the second terminal of said inductor,

- a capacitor having a first and second terminal, said first terminal being coupled with the cathode of said diode and the second terminal being coupled with the first electrode of said semiconductor switch,

- an input current sensor generating a signal proportional to an input current, and

- a control unit having at least two inputs and a control output coupled with said gate electrode, wherein the first input receives said signal from said current sensor and the second input is coupled with the first terminal of said capacitor.

2. Switching power supply according to claim 1, wherein between the first and second surface the electrical field has a rising course starting from both surfaces.

3. Switching power supply according to claim 1, wherein a degree of compensation effected by means of the doping in the areas of the first and second conductivity types has a monotonic course between the first and second surface.

4. Switching power supply according to claim 3, wherein the degree of compensation has a stepped course.

5. Switching power supply according to claim 1, wherein the first conductivity type is the n-conductivity type.

6. Switching power supply according to claim 1, wherein the areas of the first and second conductivity type are arranged vertically in the semiconductor body.

7. Switching power supply according to claim 5, wherein in the areas of the second conductivity type a degree of compensation effected by means of doping is varied such that near the first surface acceptor impurities dominate and near the second surface donor impurities dominate.

8. Switching power supply according to claim 1, wherein the areas of the second conductivity type have a roughly circular cross-section in a section

parallel to the first surface and to the second surface and assume hexagonal surface packing.

9. Switching power supply according to claim 1, wherein the areas of the second conductivity type have a roughly circular cross-section in a section parallel to the first surface and to the second surface and assume roughly square surface packing.

10. Switching power supply according to claim 1, wherein the areas of the second conductivity type have a roughly strip-shaped cross-section in a section parallel to the first surface and to the second surface.

11. Switching power supply according to claim 1, wherein the second surface is positioned at a distance from the drain zone such that the regions of the first and second conductivity type nested in each other do not reach the drain zone.

12. Switching power supply according to claim 1, wherein the input current sensor is formed by an auxiliary source of said semiconductor switch.

13. Switching power supply according to claim 12, wherein the semiconductor switch comprises a plurality of MOS transistors whose drains and gates are coupled in parallel wherein a main source is formed by the sources of a first set of said plurality of transistors coupled in parallel and the auxiliary source is formed by a second set of said plurality of transistors coupled in parallel.

14. Switching power supply according to claim 1, wherein the input current sensor is formed by a resistor coupled between the negative output terminal of said rectifier and the first electrode of said semiconductor switch.

15. Switching power supply according to claim 1, wherein the control unit comprises a ramp voltage generator coupled with said second input, a comparator receiving said ramp voltage, and a clock generator controlling said ramp voltage generator.

16. Switching power supply according to claim 15, wherein the control unit comprises a current to voltage converter generating an output voltage being fed to said comparator.

17. Switching power supply according to claim 15, wherein said ramp voltage generator comprises a transductance amplifier whose output signal charges a capacitance and a switch coupled in parallel with said capacitance being controlled by said clock generator.

18. Switching power supply according to claim 1, further comprising a resistor in parallel with said capacitor.

19. Switching power supply according to claim 15, wherein the control unit further comprises a gate driver coupled between said gate electrode and the output of said comparator.

20. Switching power supply including a power factor correction circuit comprising:

- a rectifier having a positive and a negative output terminal,

- an inductor having a first and a second terminal, said first terminal being coupled with said positive output terminal,

- an shunt resistor having a first and a second terminal, said first terminal being coupled with said negative output terminal of said rectifier,

- a semiconductor switch having a semiconductor body comprising a blocking pn junction, a gate electrode, a source zone of a first conductivity type connected to a first electrode and bordering on a zone forming the blocking pn junction of a second conductivity type complementary to the first conductivity type, and a drain zone of the first conductivity type connected to a second electrode, the side of the zone of the second conductivity type facing the drain zone forming a first surface, and in the region between the first surface and a second surface located between the first surface and the drain zone, areas of the first and second conductivity type nested in one another, wherein the areas of the first and second conductivity type are variably so doped that near the first surface doping atoms in the area of the second conductivity type predominate over those in the area of the first conductivity type, and near the second surface doping atoms in the area of the first conductivity type predominate over those in the area of the second conductivity type, wherein said second electrode is coupled to said second terminal of said inductor and said first electrode is coupled with the second terminal of said shunt resistor,

- a diode having an anode and a cathode, the anode being coupled with the second terminal of said inductor,

- a capacitor having a first and second terminal, said first terminal being coupled with the cathode of said diode and the second terminal being coupled with the first electrode of said semiconductor switch, and

- a control unit having at least two inputs and a control output coupled with said gate electrode, wherein the first input is coupled with said shunt resistor and the second input is coupled with the first terminal of said capacitor.

21. Switching power supply according to claim 20, wherein between the first and second surface the electrical field has a rising course starting from both surfaces.

22. Switching power supply according to claim 20, wherein a degree of compensation effected by means of the doping in the areas of the first and second conductivity types has a monotonic course between the first and second surface.

23. Switching power supply according to claim 22, wherein the degree of compensation has a stepped course.

24. Switching power supply according to claim 20, wherein the first conductivity type is the n-conductivity type.

25. Switching power supply according to claim 20, wherein the areas of the first and second conductivity type are arranged vertically in the semiconductor body.

26. Switching power supply according to claim 24, wherein in the areas of the second conductivity type a degree of compensation effected by means of doping is varied such that near the first surface acceptor impurities dominate and near the second surface donor impurities dominate.

27. Switching power supply according to claim 20, wherein the areas of the second conductivity type have a roughly circular cross-section in a section parallel to the first surface and to the second surface and assume hexagonal surface packing.

28. Switching power supply according to claim 20, wherein the areas of the second conductivity type have a roughly circular cross-section in a section parallel to the first surface and to the second surface and assume roughly square surface packing.

29. Switching power supply according to claim 20, wherein the areas of the second conductivity type have a roughly strip-shaped cross-section in a section parallel to the first surface and to the second surface.

30. Switching power supply according to claim 20, wherein the second surface is positioned at a distance from the drain zone such that the regions of the first and second conductivity type nested in each other do not reach the drain zone.

31. Switching power supply according to claim 20, wherein the semiconductor switch comprises a plurality of MOS transistors whose drains, sources and gates are coupled in parallel.

32. Switching power supply according to claim 20, wherein the control unit comprises a ramp voltage generator coupled with said second input, a comparator receiving said ramp voltage, and a clock generator controlling said ramp voltage generator.

33. Switching power supply according to claim 32, wherein said ramp voltage generator comprises a transductance amplifier whose output signal charges a capacitance and a switch coupled in parallel with said capacitance being controlled by said clock generator.

34. Switching power supply according to claim 20, further comprising a resistor in parallel with said capacitor.

35. Switching power supply according to claim 32, wherein the control unit further comprises a gate driver coupled between said gate electrode and the output of said comparator.